

THE LENS

INTRODUCTION

The crystalline lens is a biconvex, avascular, transparent structure enclosed by a capsule, which is a basement membrane secreted by the lens epithelium. The capsule, responsible for moulding the lens during accommodation, is thickest in the equatorial zone and thinnest at the posterior pole. A ring of zonular fibres, which insert in the equatorial region, suspends the lens from the ciliary body. A monolayer of epithelium lines only the anterior and equatorial lens capsule. Cells in the equatorial region exhibit mitotic activity. Newly formed epithelial cells elongate to form fibres, which lose their organelles, thus optimizing lens transparency.

The lens may be conceptualized as consisting of the nucleus, the central compacted core, surrounded by the cortex. New lens fibres are continuously laid down under the capsule throughout life, resulting in older layers acquiring a progressively deeper location within the lens substance. The lens thus grows in both anteroposterior and equatorial dimensions throughout life. *The normal lens is transparent; any congenital or acquired opacity in the lens capsule or substance, irrespective of the effect on vision, is a cataract.*

Cataract maturity:-

1. **Immature** cataract is one in which the lens is partially opaque.
2. **Mature** cataract is one in which the lens is completely opaque.
3. **Hypermature** cataract has a shrunken and wrinkled anterior capsule due to leakage of water out of the lens.
4. **Morgagnian** cataract is a hypermature cataract in which liquefaction of the cortex has allowed the nucleus to sink inferiorly.

Causes of cataract;

A. Acquired cataract:

1. Age related cataract
2. Cataract in systemic diseases

Diabetes mellitus: Hyperglycaemia is reflected in a high level of [glucose](#) in the aqueous humour, which diffuses into the lens. Here [glucose](#) is metabolized by aldose reductase into [sorbitol](#), which then accumulates within the lens, resulting in secondary osmotic overhydration of the lens substance.

Diabetes mellitus, in addition to causing cataract, can affect the refractive index of the lens and also its amplitude of accommodation.

Myotonic dystrophy

About 90% of patients with myotonic dystrophy develop visually innocuous, lens opacities which might progress with age.

Atopic dermatitis

About 10% of patients with severe atopic dermatitis develop cataracts in the second to fourth decades. The opacities are often bilateral and may mature quickly

Neurofibromatosis-2

3.Secondary cataract

A secondary (complicated) cataract develops as a result of some other primary ocular disease.

1.Chronic anterior uveitis:

Chronic anterior uveitis is the most common cause of secondary cataract. The incidence is related to the duration and activity of intraocular inflammation that results in prolonged breakdown of the blood-aqueous or blood-vitreous barrier. The use of steroids, topically and systemically, is also important.

2. Acute congestive angle-closure glaucoma : They represent focal infarcts of the lens epithelium and are pathognomonic of past acute angle-closure glaucoma.

4.Traumatic Cataract: may result from blunt or penetrating trauma

5.Drug Induced Cataract:

Steroids: both systemic and topical, are cataractogenic. The lens opacities are initially posterior subcapsular and later the anterior subcapsular region becomes affected. The relationship between weekly systemic dose, duration of administration, total dose and cataract formation is unclear. It is thought that patients on less than 10mg [prednisolone](#)[®] (or equivalent), or treated for less than 4 years may be immune. Although it is believed that children may be more susceptible to the cataractogenic effects of systemic steroids, individual (genetic) susceptibility may also be of relevance. It has therefore been suggested that the concept of a safe dose be abandoned. Patients who develop lens changes should have their dosage reduced to

a minimum consistent with control of the underlying disease, and if possible be considered for alternate day therapy. Early opacities may regress if therapy is discontinued; alternatively progression may occur despite withdrawal and warrant surgical intervention.

Other Drugs include: Chlorpromazine, Busulphan (Myleran), Gold, Allupurinol.

B. CONGENITAL CATARACT

Aetiology

Congenital cataracts occur in about 3:10,000 live births; two-thirds of cases are bilateral. The cause of cataract formation can be identified in about half of those with *bilateral opacities*. Including:

1. Autosomal dominant (AD) the most common cause.
2. chromosomal abnormalities such as Down syndrome,
3. metabolic disorders such as galactosaemia.
4. intrauterine insults such as rubella infection.

The underlying factors of unilateral congenital cataracts remain less clear and the cause can be identified only in approximately 10% of cases. Unilateral cataracts are usually sporadic, without a family history or systemic disease, and affected infants are usually full-term and healthy. *The most common association with unilateral cataracts is persistent anterior fetal vasculature*

Treatment : surgery

MANAGEMENT OF AGE-RELATED CATARACT

Preoperative considerations

Indications for surgery

1. **Visual improvement** is by far the most common indication for cataract surgery, although requirements vary from person to person. Surgery is indicated only if and when cataract develops to a degree sufficient to cause difficulty in performing daily essential activities. If the patient desires to drive or continue a specific occupation, visual function below legally prescribed levels may necessitate surgery.
2. **Medical Indications:** Cataract surgery to improve the clarity of the ocular media may also be required in the context of fundal pathology (e.g. diabetic retinopathy) requiring monitoring or treatment.
3. **Cosmetic** indications are rare, such as when a mature cataract in an otherwise blind eye is removed to restore a black pupil.

Surgery:

1. Intracapsular Cataract extraction: old procedure ,rarely performed nowadays.
2. Extracapsular Cataract extraction: involve an 8-9mm incision at the limbus through which the lens nucleus expressed, leaving the capsular bag intact for IOL insertion, then the wound closed with 10zero nylon sutures.
3. Phacoemulsification: Is the modern procedure in cataract surgery. It needs a sophisticated machine and considerable skills.It involve a 2.8mm wound through which the lens removed and a foldable IOL inserted, often without suturing.

Operative complications:

1. Rupture of the posterior capsule.
2. Posterior loss of lens fragment.
3. Posterior dislocation of IOL into the vitreous cavity reflects inappropriate implantation and is rare.
4. Suprachoroidal haemorrhage : A suprachoroidal haemorrhage is a bleed into the suprachoroidal space which may result in extrusion of intraocular contents or apposition of retinal surfaces.
5. Acute postoperative endophthalmitis: Acute endophthalmitis is a devastating complication of intraocular surgery. The estimated incidence following cataract surgery is approximately 0.15%.

ECTOPIA LENTIS

Ectopia lentis refers to a displacement of the lens from its normal position. The lens may be completely dislocated, rendering the pupil aphakic (luxated), or partially displaced, still remaining in the pupillary area (subluxated). Ectopia lentis may be

a.hereditary

b. acquired: Acquired causes include

1. trauma
- 2.large eye (i.e. high myopia, buphthalmos)
- 3.anterior uveal tumours
- 4.hypermature cataract.